PREPARATION OF CALCIUM CARBONATE WITH A DIFFERENT CRYSTAL STRUCTURE
EXPLOITING FLUE GAS DESULPHURIZATION GYPSUM

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Cleaning of flue gases containing sulphur dioxide using limestone enables a desired decrease in the sulphur dioxide impact on environment; however huge amounts of Flue Gas Desulphurization Gypsum (FGDG) are generated.

FGDG is of a high quality when all the technological steps (filtration of flue gases, formation of gypsum from SO₂, O₂, H₂O and CaCO₃, washing of FGDG, etc.) are performed properly. The high quality of the formed FGDG (the content of gypsum more than 95 %, very low content of heavy metals) allows to exploit it not only as a component of constructional materials, but utilization as a fertilizer, or a raw material for the production of ammonium sulphate and CaCO₃ is of interest, too. The formed CaCO₃ may be treated by the next technological steps in order to obtain a higher purity, well defined crystallographic modifications of CaCO₃ and the size of particles.

This contribution reports about selected results from the preparation of pure CaCO₃ of different crystal structures and different particle size for special applications. At first, a technical grade CaCO₃ was prepared from FGDG, ammonia and carbon dioxide. Effects of temperature, pressure, concentration of FGDG and excess of reagents on the yield and purity of CaCO₃ were studied. Afterwards, the CaCO₃ was decomposed with nitric acid and the impurities were removed by filtration. CaCO₃ of a defined quality was prepared from the solution of calcium nitrate by reacting it with ammonia and carbon dioxide, or with urea, or with ammonium carbonate. In this part of our investigation the formation of different crystallographic CaCO₃ phases (calcite, vaterite and aragonite) and the particle size was studied under various technological parameters (concentrations, temperature, pressure, reaction time).

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Literature: